CLAIMS

We claim:

1. An isolated, pure population of mammalian CNS glial restricted precursor cells that is capable of generating oligodendrocytes and at least two distinct populations of astrocytes.

2. The population of claim 1 wherein said glial restricted precursor cells are isolated from a mammal selected from the group consisting of human and non-human primates, equines, canines, felines, bovines, porcines, ovines, and lagomorphs.

3. The population of claim 1 wherein said glial restricted precursor cells express cell surface antigens recognized by the A2B5 monoclonal antibody, but do not express embryonic neural cell adhesion molecule.

4. The population of claim 1 wherein said glial restricted precursor cells acquire the ability to respond to platelet-derived growth factor as a mitogen after growth *in vitro* in the presence of medium containing fibroblast growth factor and platelet-derived growth factor.

5. The population of claim 1 wherein said glial restricted precursor cells are capable of differentiating into oligodendrocytes, A2B5-positive process-bearing astrocytes, and

A2B5-negative astrocytes with fibroblast-like morphology.

6. The population of claim 1 wherein said glial restricted precursor cells are capable of self renewal in adherent feeder-cell-independent culture medium and of differentiation to CNS glial cells but not to CNS neuronal cells.

7. A method of isolating a pure population of mammalian CNS glial restricted precursor cells comprising the steps of:

(a) removing a sample of CNS tissue from a mammal at a stage of development after closure of the neural tube;

(b) dissociating cells comprising the sample of CNS tissue removed from the mammal; and

(c) purifying from the dissociated cells a subpopulation expressing a selected antigen defining glial restricted precursor cells.

8. The method of claim 7 wherein said selected antigen defining glial restricted precursor cells is a cell surface antigen recognized by the A2B5 antibody.

9. The method of claim 7 wherein said purifying comprises a procedure selected from the group consisting of specific antibody capture, fluorescence activated cell sorting, and magnetic bead capture.

10. The method of claim 9 wherein said procedure is specific antibody capture.

11. The method of claim 7 wherein said mammal is selected from the group consisting of human and non-human primates, equines, canines, felines, bovines, porcines, ovines, and lagomorphs.

12. A pure population of mammalian CNS glial restricted precursor cells isolated by the method of claim 7.

13. A method of obtaining glial cells comprising:

(a) providing glial restricted precursor cells; and

(b) plating the glial restricted precursor cells under differentiating conditions, thereby causing the glial restricted precursor cells to differentiate into glial cells.

14. The method of claim 13 wherein said differentiating conditions comprise addition to growth medium of an effective amount of a factor that promotes differentiation into non-process bearing $A2B5^{-}GFAP^{+}$ astrocytes and said glial cells are $A2B5^{-}GFAP^{+}$ astrocytes.

15. The method of claim 14 wherein said factor that promotes differentiation into non-process bearing $A2B5^{-}GFAP^{+}$ astrocytes comprises fetal calf serum.

16. The method of claim 13 wherein said differentiating conditions comprise addition to growth medium of an effective amount of a factor that promotes differentiation into process bearing $A2B5^{+}GFAP^{+}$ astrocytes and said glial cells are $A2B5^{+}GFAP^{+}$ astrocytes.

17. The method of claim 16 wherein said factor that promotes differentiation into process bearing $A2B5^{+}GFAP^{+}$ astrocytes comprises ciliary neurotrophic factor and basic fibroblast growth factor.

18. The method of claim 13 wherein said differentiating conditions comprise addition to growth medium of an effective amount of a factor that promotes differentiation into oligodendrocytes and said glial cells are oligodendrocytes.

19. The method of claim 18 wherein said factor that promotes differentiation into oligodendrocytes comprises platelet-derived growth factor and thyroid hormone (T3).

20. A method for treating a neurological or neurodegenerative disease comprising administering to a mammal in need of such treatment an effective amount of glial restricted precursor cells or derivatives thereof or mixtures thereof.

21. The method of claim 20 wherein said glial restricted

precursor cells or derivatives thereof or mixtures thereof are caused to proliferate and differentiate *in vitro* prior to being administered.

22. The method of claim 20 wherein said glial restricted precursor cells or derivatives thereof or mixtures thereof are caused to proliferate *in vitro* prior to being administered, and then are caused to further proliferate and differentiate *in vivo* after being administered.

23. The method of claim 20 wherein said glial restricted precursor cells or derivatives thereof or mixtures thereof are caused to proliferate *in vitro* prior to being administered, and then are caused to differentiate *in vivo* after being administered.

24. The method of claim 20 wherein said glial restricted precursor cells or derivatives thereof or mixtures thereof are from a heterologous donor.

25. The method of claim 24 wherein said donor is a fetus.

26. The method of claim 24 wherein said donor is a juvenile.

27. The method of claim 24 wherein said donor is an adult.

28. The method of claim 20 wherein said glial restricted precursor cells or derivatives thereof or mixtures thereof are from an autologous donor.

29. The method of claim 28 wherein said donor is a fetus.

30. The method of claim 28 wherein said donor is a juvenile.

31. The method of claim 28 wherein said donor is an adult.

32. The method of claim 20 wherein said disease is selected from the group consisting of multiple sclerosis, spinal cord injury, CNS trauma, conditions in which axonal regeneration are desired, conditions in which control or reduction in glial scarring are desired, any dysmyelinating disorder, or an enzymatic disorder.

33. The method of claim 20 wherein said glial restricted precursor cells or derivatives thereof or mixtures thereof are administered locally in the CNS.

34. The method of claim 20 wherein said glial restricted precursor cells or derivatives thereof or mixtures thereof are

widely administered in the CNS.

35. The method of claim 20 wherein said glial restricted precursor cells or derivatives thereof or mixtures thereof are administered in an encapsulation device.

36. The method of claim 20 wherein said derivatives thereof are obtained by differentiation of glial restricted precursor cells *in vitro*.

37. The method of claim 20 wherein said derivatives thereof are obtained by genetic transduction of glial restricted precursor cells.

38. A method for treating neurodegenerative symptoms in a mammal comprising the steps of:

(a) providing a pure population of glial restricted precursor cells;

(b) genetically transforming said glial restricted precursor cells with a gene encoding a growth factor, neurotransmitter, neurotransmitter synthesizing enzyme, neuropeptide, neuropeptide synthesizing enzyme, or substance that provides protection against free-radical mediated damage thereby resulting in a transformed population of glial restricted precursor cells that express said growth factor, neurotransmitter, neurotransmitter synthesizing enzyme,

neuropeptide, neuropeptide synthesizing enzyme, or substance that provides protection against free-radical mediated damage; and

(c) administering an effective amount of said transformed population of glial restricted precursor cells to said mammal.

39. A method of using glial restricted precursor cells for reducing glial scar formation associated with surgical procedures at a lesion site in the central nervous system comprising the steps of:

(a) providing a composition comprising cells selected from the group consisting of a purified population of glial restricted precursor cells, derivatives thereof, and mixtures thereof;

(b) administering said an effective amount of said composition into and adjacent to said lesion site within two weeks following traumatic injury thereto.

40. The method of claim 38 wherein said composition comprises encapsulated cells.

41. The method of claim 38 wherein said composition further comprises O-2A progenitor cells.

42. A method for promoting wound healing at a lesion site in the central nervous system comprising the steps of:

(a) providing a composition comprising cells selected from the group consisting of a purified population of glial restricted

precursor cells, derivatives thereof, and mixtures thereof;

(b) administering an effective amount of said composition into and adjacent to said lesion site within two weeks following traumatic injury thereto.

43. A method for promoting neuronal survival or axonal regeneration or both in the central nervous system comprising the steps of:

(a) providing a pure population of glial restricted precursor cells or derivatives thereof of mixtures thereof;

(b) administering an effective amount of the population of glial restricted precursor cells or derivatives thereof or mixtures thereof to the CNS of the mammal into regions of neuronal injury or regions in which axonal regeneration is required.

44. A method for treating neurodegenerative symptoms in a mammal comprising the steps of:

(a) providing a pure population of glial restricted precursor cells or derivatives thereof of mixtures thereof;

(b) administering an effective amount of the population of glial restricted precursor cells or derivatives thereof or mixtures thereof to the CNS of the mammal.

45. A method for treating neurodegenerative symptoms in a mammal comprising the steps of

(a) providing a pure population of glial restricted precursor cells or derivatives thereof or mixtures thereof;

(b) placing the glial restricted precursor cells or derivatives thereof or mixtures thereof in an encapsulation device to result in encapsulated cells; and

(c) administering an effective amount of the encapsulated cells to the CNS of the mammal.

46. A method for treating neurodegenerative symptoms in a mammal comprising the steps of:

(a) providing a pure population of glial restricted precursor cells or derivatives thereof or mixtures thereof;

(b) placing the glial restricted precursor cells or derivatives thereof or mixtures thereof on or in a scaffold to result in scaffold-associated cells; and

(c) administering an effective amount of the population of scaffold-associated cells to the CNS of the mammal.

47. A method for promoting axonal growth along defined scaffolds comprising the steps of:

(a) providing a pure population of glial restricted precursor cells or derivatives thereof or mixtures thereof;

(b) implanting a scaffold such that a bridge is formed between a region where a desired population of neurons exists and a region to which neuronal growth is desired; and

(c) placing an effective amount of the glial restricted

precursor cells or derivatives thereof or mixtures thereof on or in the scaffold.

48. A method for screening compounds for neurological activity comprising the steps of:

(a) providing a pure population of glial restricted precursor cells or derivatives thereof or mixtures thereof cultured *in vitro*;

(b) exposing said cells or derivatives thereof or mixtures thereof to a selected compound at varying dosages; and

(c) monitoring the reaction of said cells or derivatives thereof or mixtures thereof to said selected compound for selected time periods.

49. A method for continuously propagating glial restricted precursor cells comprising the steps of:

(a) providing said glial restricted precursor cells; and

(b) culturing said glial restricted precursor cells *in vitro* in the presence of minimal essential salts and effective amounts of platelet derived growth factor and fibroblast growth factor.